TOPIC: PROPOSAL TO OFFER A DOCTOR OF PHILOSOPHY DEGREE IN SYSTEMS ENGINEERING AT COLORADO STATE UNIVERSITY

PREPARED BY: MARGOT PLOTZ

I. SUMMARY

Colorado State University (CSU) has submitted a proposal to offer a Doctor of Philosophy (PhD) in Systems Engineering. This proposed program will focus primarily on demand, supply and distribution of energy systems under a systems engineering approach. This program will be vital to the collaboration of all departments at CSU in the field of systems engineering and energy systems and will add to the rich curriculums with additional courses in power engineering, energy conversion, systems architecture and energy storage.

II. BACKGROUND

The following is summarized from Colorado State University's request:

> Increasingly, engineering problems require the development of complex multidisciplinary systems. This trend has driven the need for Systems Engineering as a formal discipline. Systems Engineering provides both a framework and a rigorous theoretical underpinning for the design and management of complex engineering systems. This necessitates a multidisciplinary approach, utilizing tools from a variety of fields including control systems, operations research, reliability and performance engineering, risk analysis, software engineering, and networking and security.

ROLE AND MISSION SUPPORT

This degree supports the role and mission of Colorado State University. The statutory mission states:

> *There is hereby established a university at Fort Collins to be known as Colorado state university. Colorado state university shall be a comprehensive graduate research university with selective admission standards offering a comprehensive array of baccalaureate, masters, and doctoral degree programs. C.R.S. 23-30-101.*

EVIDENCE OF STUDENT DEMAND

> Systems engineering is naturally a multidisciplinary field of study with many components, including control systems, operations research, reliability and performance engineering, risk analysis, software engineering, networking and security. Many practicing engineers in the field have formally trained in one of these areas and

then migrated into systems engineering with on-the-job training. Academia can offer a broad, but also deep, study of the field that is virtually impossible to duplicate outside the university setting.

DUPLICATION/SIMILAR PROGRAMS IN THE STATE

In Colorado, the only other PhD program in a related area is at Colorado School of Mines (CSM), which offers a Doctor of Philosophy degree in Engineering Systems. CSM's program focuses more on the component level (e.g., power electronics and inverters), and less on the higher systems level, involving design/management of complex systems of interacting components, which is the target area for the proposed CSU program. At the same time, CSM does not have the resources that CSU possesses for research on such complex systems (e.g., the InteGrid[1] facility for smart grid research). We view the CSM program as complementary to the one being proposed at CSU.

The proposed CSU program in Systems Engineering-Energy Systems fills a need for an advanced graduate training program in this area that is not currently provided by any institutes of higher learning in the state of Colorado. This will provide students with a unique opportunity at CSU, to pursue advanced training and research in this exciting and important area.

III. STAFF ANALYSIS

The Department staff has reviewed this proposed program to ensure that it meets the State's performance measures outlined in C.R.S. §23-5-129(6) (b). The program meets all performance measures set forth by the state.

IV. STAFF RECOMMENDATIONS

Staff recommends that the Commission approve the Doctor of Philosophy degree in Systems Engineering to be offered by Colorado State University.

V. SUPPLEMENTAL INFORMATION

Copies of all relevant materials are on file in the Academic Affairs office and are available upon request

STATUTORY AUTHORITY

C.R.S. §23-5-129(6) (b).

[1] InteGrid website: http://www.integridlab.com/